ERS-401

COSTS OF STORING AND HANDLING GRAIN IN COMMERCIAL ELEVATORS,

1967-68 and projections for 1969-70

ECONOMIC RESEARCH SERVICE
U.S. DEPARTMENT OF AGRICULTURE

CONTENTS

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Highlights

Reductions in stock available for storage, a continued surplus of storage facilities, and increased cost of inputs caused a sharp increase in grain storage costs in 1967-68 and in estimated costs for 1969-70. Lower average occupancy, only 39 percent in 1967-68 and about 40 percent in 1969-70 compared with 62 percent in 1964-65, was the major reason for higher costs (table 12).

This conclusion is based on an analysis of a subsample of 96 of the 252 firms studied in 1965 and reported in Costs of Storing and Handling Grain in Commercial Elevators, 1964-65, USDA, ERS-288, April 1966. The current study was designed to determine the changes that had occurred in volumes stored and handled, wage rates, total wages, assets, and other pertinent information affecting costs of handling and storing grain. Differences in volumes and costs at the plants studied for the 2 years were used as the basis for estimating changes occurring since the 1964-65 base period. Detailed information on the methodology used is given in the appendix.

Utilization of facilities at 1967-68 occupancy levels resulted in average cost for storage alone of 11.8, 15.5, and 13.3 cents per bushel at country facilities, inland terminals, and port terminals, respectively (table 1). The estimated cost for storing and handling by the most common methods averaged 18.3 cents per bushel at country elevators, 20.0 cents at inland terminals, and 16.7 cents at port terminals.

Assuming total storage requirements of about 3 billion bushels, estimated 1967-68 shortrun competitive rates for handling by the most common method and for 1 year's storage would range from 2.5 cents at port terminals in the West to 11.5 cents at inland terminals in the South and East, (table 1, fig. 5 and 3). Longrun rates would range from 9.0 to 24.0 cents per bushel (table 1, fig. 3). Comparable rates for storage only at all facilities averaged 3.5 cents per bushel in the short run and 9.0 cents in the long run (table 1).

Shortrun competitive rates would cover the out-of-pocket or cash cost of the marginal firm under conditions of pure competition. Longrun rates include cash cost plus interest and depreciation of the marginal firm.

Storage cost projections for 1969-70, assuming 1967-68 volume distribution patterns, averaged 11.6, 15.1, and 12.8 cents per bushel at country facilities,

inland terminals, and port terminals, respectively (table 2). The combined cost for handling and 1 year's storage averaged 18.5, 20.0, and 16.4 cents per bushel. Shortrun 1969-70 competitive rate projections for storage and handling based on maximum total storage needs of 3.3 billion bushels averaged 9.0, 7.5, and 7.5 and longrun rates, 16.5, 12.5, and 18.0 at country, inland, and port facilities (table 2, fig. 7, 9, and 11). Rates for storage alone at all facilities averaged 3.5 and 9.5 cents per bushel in the short and long run (table 2). These rates are based on estimated 1969-70 price levels and volumes, assuming that elevators remaining in operation would have an annual occupancy of about 65 percent. Peak utilization of plants remaining in operation would be about 90 percent.

Estimated costs by item for all functions, areas, and the United States for 1967-68 and 1969-70 are shown in tables 4 through 11.

Table 1.--Estimated weighted average cost and competitive rates for handling and storing grain by area, type of facility, and most common handling method, fiscal 1967-68 1/

Area, type of facility, and most common handling method	Average cost for--								Competitive rates 2/			
	Receiving		Shipping		Storage		Combined		Storage		Storage and handling	
	Out-of-pocket cost 3/	Total cost 4/	Out-of-pocket cost 3/	Total cost 4/	Out-of-pocket cost 3/	Total cost 4/	Out-of-pocket cost 3/	Total cost 4/	Short run 5/	Long run 6/	Short run 5/	Long run 6/
	Cents											
North Plains												
Country:												
Truck & rail 7/	1.9	2.3	1.5	1.8	5.2	11.4	8.6	15.5	6.0	16.5	9.5	21.0
Inland terminal:												
Rail & rail 8/	1.3	1.7	1.3	1.7	4.5	12.0	7.1	15.4	2.5	7.0	5.0	10.0
Mid-Plains												
Country:												
Truck & rail	1.7	2.4	2.9	4.5	3.8	12.5	8.4	19.4	2.5	6.5	7.0	12.5
Inland terminal:												
Rail & rail	1.4	2.1	2.0	2.9	3.9	16.0	7.3	21.0	2.0	6.0	5.0	9.0
South Plains												
Country:												
Truck & rail	2.0	2.9	2.9	4.5	4.5	10.1	9.4	17.5	4.0	7.5	9.5	13.5
Inland terminal:												
Rail & rail	1.3	2.1	1.8	2.5	5.1	14.8	8.2	19.4	4.0	8.0	9.0	11.5
Port terminal:												
Rail & water 9/	1.3	1.7	0.7	0.8	3.5	11.8	5.5	14.3	3.5	12.0	4.0	13.0
West												
Country:												
Truck & rail	1.5	2.3	2.1	3.2	4.8	17.3	8.4	22.8	3.0	10.5	6.0	14.5
Inland terminal:												
Rail & rail	2.2	2.6	1.5	1.7	5.2	13.6	8.9	17.9	3.0	7.0	5.5	9.5
Port terminal:												
Rail & water	1.1	1.8	0.6	1.0	3.6	15.1	5.3	17.9	1.0	12.5	2.5	15.0
Great Lakes												
Country:												
Truck & rail	1.2	1.5	1.5	2.0	4.3	12.2	7.0	15.7	5.0	9.0	9.0	14.0
Inland terminal:												
Rail & rail	1.8	2.7	1.4	1.6	4.8	13.0	8.0	17.3	3.0	12.0	7.0	15.5
Port terminal:												
Rail & water	2.2	3.6	0.9	1.5	4.1	12.3	7.2	17.4	4.0	14.0	8.0	17.0
South & East												
Country:												
Truck & rail	1.4	2.1	2.1	3.0	3.5	10.8	7.0	15.9	3.0	11.0	6.5	15.0
Inland terminal:												
Rail & rail	0.7	1.1	0.5	0.7	10.5	34.0	11.7	35.8	9.0	21.0	11.5	24.0
Port terminal:												
Rail & water	1.3	1.6	0.8	1.1	2.9	16.4	5.0	19.1	3.0	15.0	4.0	17.0
United States												
Country:												
Truck & rail	1.8	2.5	2.7	4.0	4.4	11.8	8.9	18.3	4.0	9.0	8.0	14.5
Inland terminal:												
Rail and rail	1.4	2.4	1.7	2.4	4.5	15.5	7.6	20.0	3.0	8.0	6.0	12.5
Port terminal:												
Rail & water	1.5	2.3	0.8	1.1	3.6	13.3	5.9	16.7	4.0	13.0	7.0	17.0
All facilities	1.5	2.3	0.9	1.3	4.3	14.0	6.7	17.6	3.5	9.0	7.5	14.0

1/ Cost based on estimated 1967-68 replacement values and volumes.
2/ Rates based on 1967-68 price and volume estimates. Calculations based on assumption that all facilities would be utilized at 65-percent capacity and most common method of handling would be used.
3/ Excludes depreciation and interest values.
4/ Includes depreciation and interest values.
5/ Cost of marginal firm excluding depreciation and interest.
6/ Cost of marginal firm including depreciation and interest.
7/ Grain received by truck and shipped by rail.
8/ Grain received by rail and shipped by rail.
9/ Grain received by rail and shipped by water.

Note: See table 12 for delineation of area.

Table 2.--Estimated weighted average cost and competitive rates for handling and storing grain by area, type of facility, and most common handling method, fiscal 1969-70 1/

Area, type of facility, and most common handling method	Average cost for--								Competitive rates 2/			
	Receiving		Shipping		Storage		Combined		Storage		Storage and handling	
	Out-of-pocket cost 3/	Total cost 4/	Out-of-pocket cost 3/	Total cost 4/	Out-of-pocket cost 3/	Total cost 4/	Out-of-pocket cost 3/	Total cost 4/	Short run 5/	Long run 6/	Short run 5/	Long run 6/
	Cents											
North Plains												
Country:												
Truck & rail 7/	2.0	2.4	1.5	1.9	5.3	11.5	8.8	15.8	6.5	18.5	10.5	25.0
Inland terminal:												
Rail & rail 8/	1.3	1.8	1.3	1.8	4.8	11.8	7.4	15.4	2.5	7.5	5.0	10.5
Mid-Plains												
Country:												
Truck & rail	1.9	2.6	3.1	4.8	3.9	12.2	8.9	19.6	2.5	7.5	7.5	14.0
Inland terminal:												
Rail & rail	1.5	2.3	2.1	3.1	3.9	15.4	7.5	20.8	3.0	8.5	7.5	13.5
South Plains												
Country:												
Truck & rail	2.1	3.1	3.1	4.8	4.8	10.2	10.0	18.1	4.0	7.5	10.5	14.5
Inland terminal:												
Rail & rail	1.5	2.4	1.8	2.7	5.2	14.4	8.5	19.5	4.0	8.0	6.5	12.0
Port terminal:												
Rail & water 9/	1.4	1.8	0.7	0.9	3.7	11.6	5.8	14.3	3.5	13.0	4.5	14.5
West												
Country:												
Truck & rail	1.6	2.4	2.3	3.4	4.7	16.7	8.6	22.5	3.0	11.5	7.5	17.0
Inland terminal:												
Rail & rail	2.3	2.8	1.6	1.9	5.2	13.2	9.1	17.9	3.0	7.5	5.5	10.5
Port terminal:												
Rail and water	1.1	1.9	0.6	1.1	3.6	14.6	5.3	17.6	2.0	14.0	4.0	16.5
Great Lakes												
Country:												
Truck & rail	1.2	1.6	1.6	2.0	4.6	12.1	7.4	15.7	4.5	11.0	9.0	17.0
Inland terminal:												
Rail & rail	1.9	2.8	1.5	1.7	4.8	12.6	8.2	17.1	4.5	9.5	9.0	14.5
Port terminal:												
Rail & water	2.3	3.9	1.0	1.6	4.2	11.8	7.5	17.3	4.5	16.5	9.0	20.5
South & East												
Country:												
Truck & rail	1.5	2.2	2.2	3.2	3.5	9.7	7.2	15.1	4.0	12.5	8.5	17.5
Inland terminal:												
Rail & rail	0.7	1.2	0.5	0.8	11.0	35.0	12.2	37.0	9.0	22.5	10.5	25.0
Port terminal:												
Rail & water	1.3	1.7	0.9	1.2	2.9	15.8	5.1	18.7	3.0	16.5	4.5	18.5
United States												
Country:												
Truck & rail	1.9	2.7	2.8	4.2	4.6	11.6	9.3	18.5	4.0	10.5	9.0	16.5
Inland terminal:												
Rail & rail	1.5	2.3	1.8	2.6	4.6	15.1	7.9	20.0	3.5	8.5	7.5	12.5
Port terminal:												
Rail & water	1.6	2.4	0.8	1.2	3.7	12.8	6.1	16.4	4.5	15.0	7.5	18.0
All facilities	1.6	2.4	0.9	1.4	4.3	13.7	6.8	17.5	3.5	9.5	8.5	15.5

1/ Cost based on estimated 1969-70 replacement values and volumes.
2/ Rates based on 1969-70 price and volume estimates. Calculations based on assumption that all facilities would be utilized at 65-percent capacity and most common method of handling would be used.
3/ Excludes depreciation and interest values.
4/ Includes depreciation and interest values.
5/ Cost of marginal firm excluding depreciation and interest.
6/ Cost of marginal firm including depreciation and interest.
7/ Grain received by truck and shipped by rail.
8/ Grain received by rail and shipped by rail.
9/ Grain received by rail and shipped by water.

Note: See table 12 for delineation of areas.

Table 3.--Estimated maximum storage requirements by area and United States, fiscal 1967-68 and 1969-70 1/

Area	Total for year	
	1967-68	1969-70
	Millions of bushels	
North Plains	353	406
Mid Plains	1,025	1,117
South Plains	533	575
West	213	237
Great Lakes	636	711
South and East	283	338
United States	3,043	3,384

1/ Estimated on basis of maximum stocks, adjusted for required working space. Maximum stocks estimated on basis of total supply and disappearance projections.

Note: See table 12 for delineation of areas.

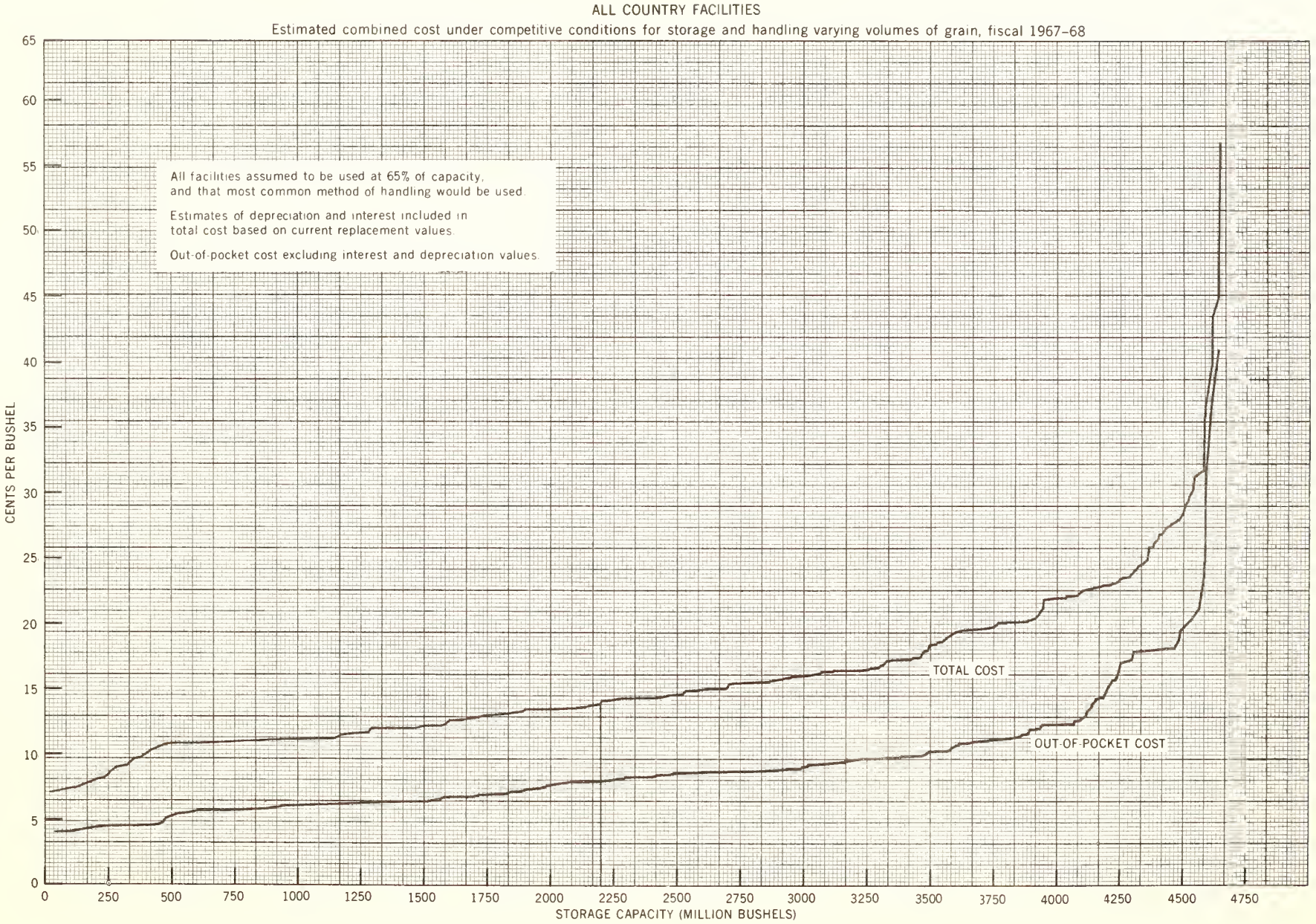
ALL COUNTRY FACILITIES
Estimated combined cost under competitive conditions for storage and handling varying volumes of grain, fiscal 1967–68
All facilities assumed to be used at 65% of capacity, and that most common method of handling would be used.
Estimates of depreciation and interest included in total cost based on current replacement values.
Out-of-pocket cost excluding interest and depreciation values.
TOTAL COST
OUT-OF-POCKET COST
CENTS PER BUSHEL
0
5
10
15
20
25
30
35
40
45
50
55
60
65
0
250
500
750
1000
1250
1500
1750
2000
2250
2500
2750
3000
3250
3500
3750
4000
4250
4500
4750
STORAGE CAPACITY (MILLION BUSHELS)

FIGURE 1

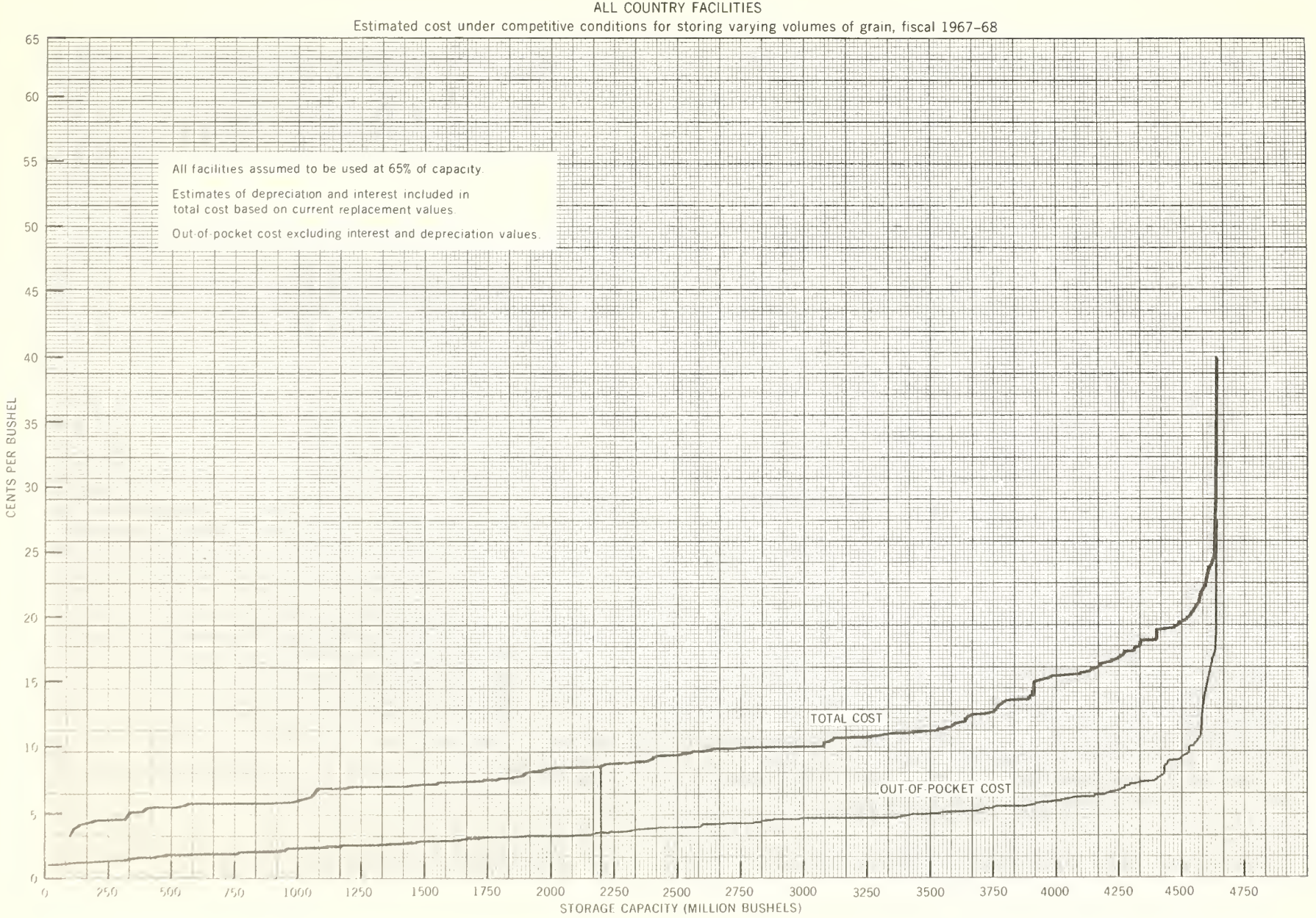
ALL COUNTRY FACILITIES
Estimated cost under competitive conditions for storing varying volumes of grain, fiscal 1967–68
All facilities assumed to be used at 65% of capacity.
Estimates of depreciation and interest included in total cost based on current replacement values.
Out-of-pocket cost excluding interest and depreciation values.
CENTS PER BUSHEL
0
5
10
15
20
25
30
35
40
45
50
55
60
65
TOTAL COST
OUT-OF-POCKET COST
0
250
500
750
1000
1250
1500
1750
2000
2250
2500
2750
3000
3250
3500
3750
4000
4250
4500
4750
STORAGE CAPACITY (MILLION BUSHELS)

FIGURE 2

ALL INLAND TERMINALS

Estimated combined cost under competitive conditions for storage and handling varying volumes of grain, fiscal 1967-68

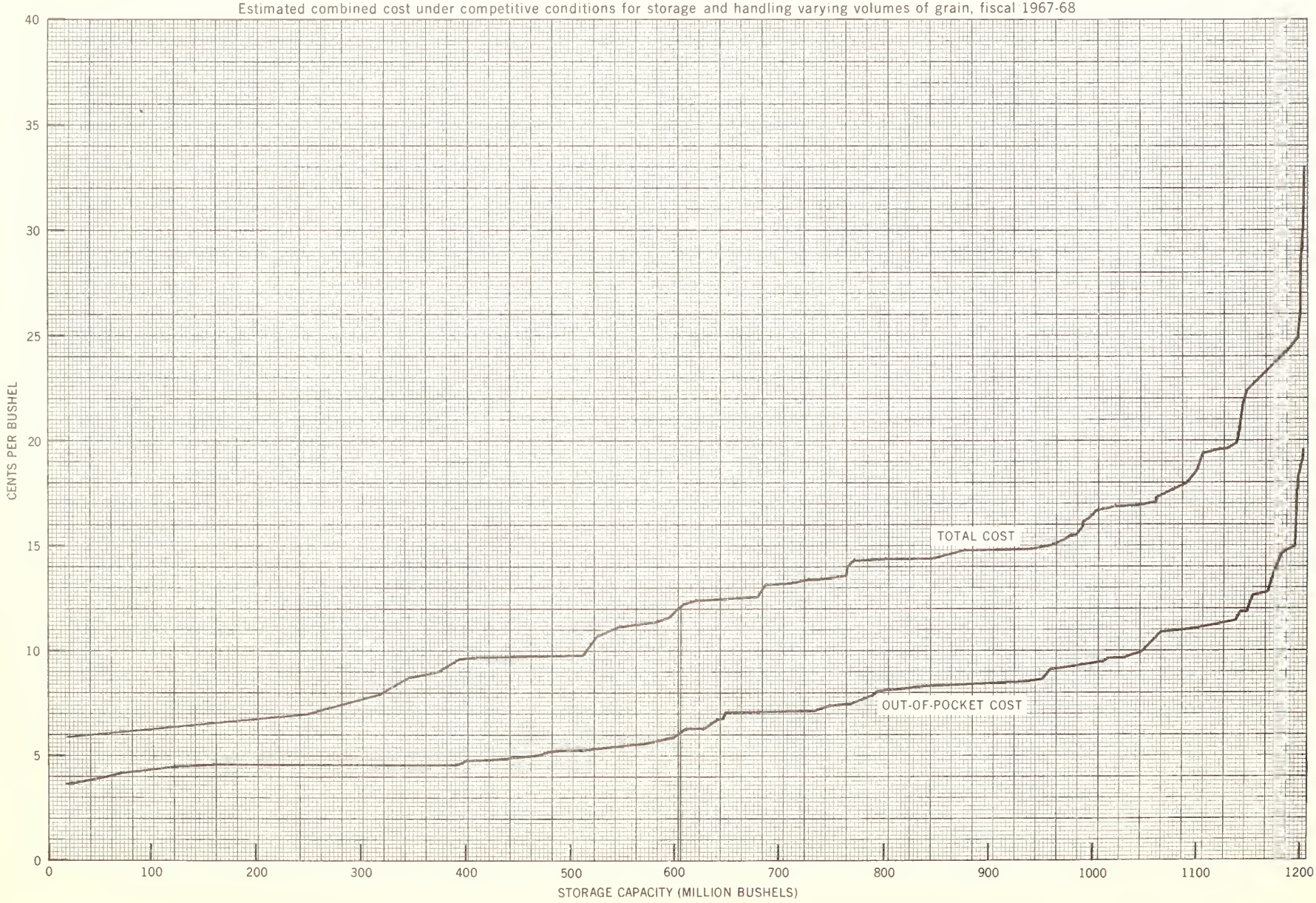

FIGURE 3

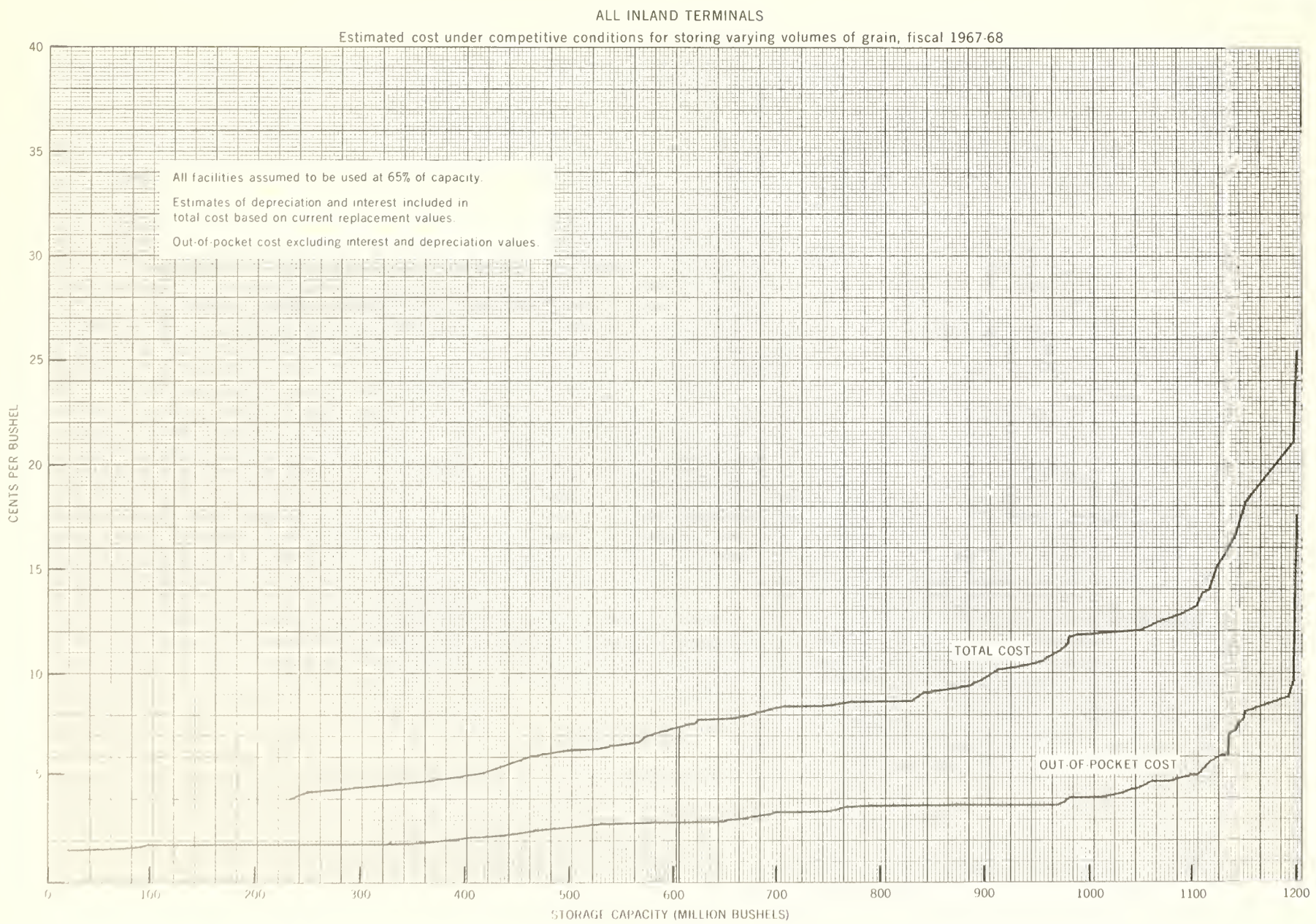
ALL INLAND TERMINALS
Estimated cost under competitive conditions for storing varying volumes of grain, fiscal 1967-68
All facilities assumed to be used at 65% of capacity.
Estimates of depreciation and interest included in total cost based on current replacement values.
Out-of-pocket cost excluding interest and depreciation values.
TOTAL COST
OUT-OF-POCKET COST
CENTS PER BUSHEL
40
35
30
25
20
15
10
5
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
STORAGE CAPACITY (MILLION BUSHELS)

FIGURE 4

ALL PORT TERMINALS

Estimated combined cost under competitive conditions for storage and handling varying volumes of grain, fiscal 1967-68

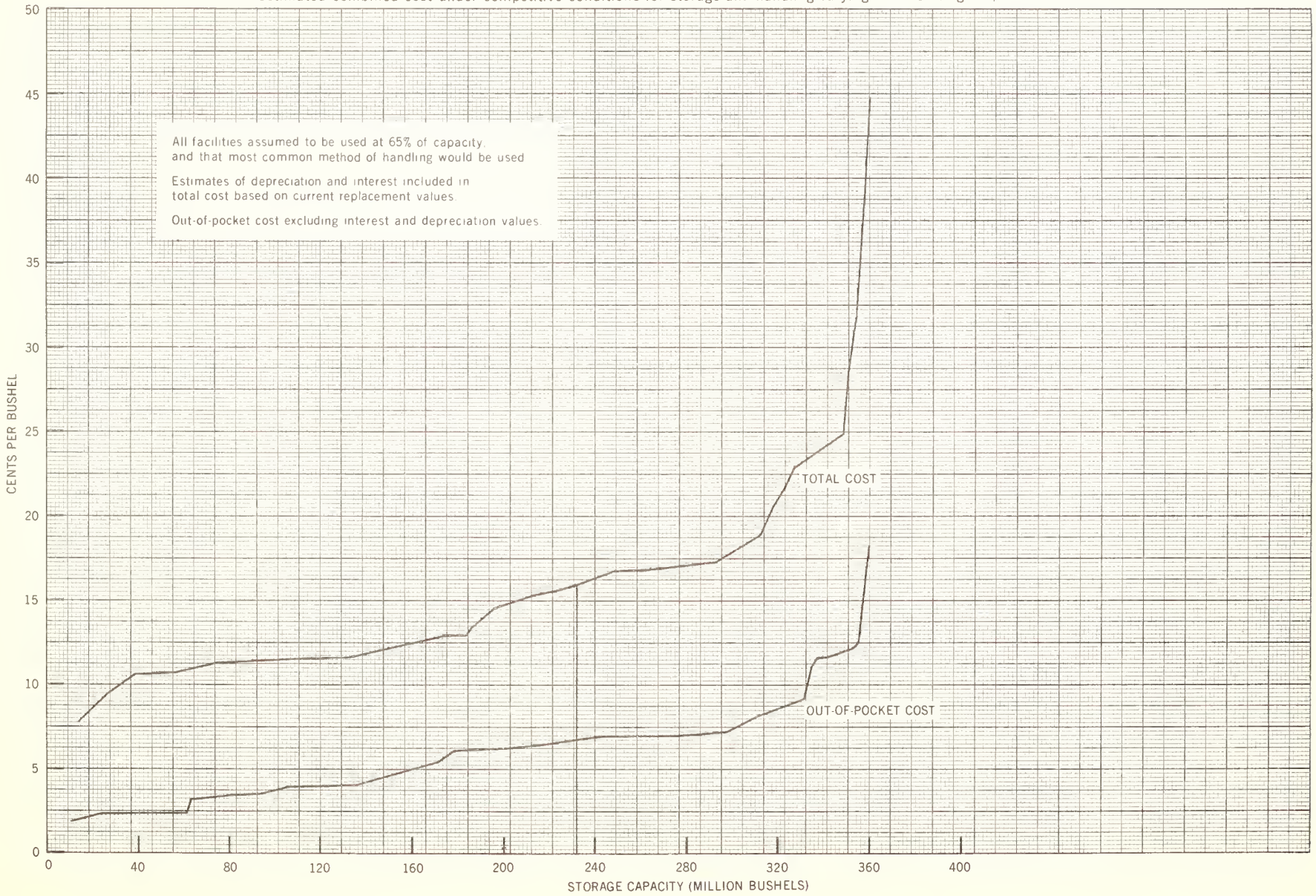

FIGURE 5

ALL PORT TERMINALS

Estimated cost under competitive conditions for storing varying volumes of grain, fiscal 1967-68

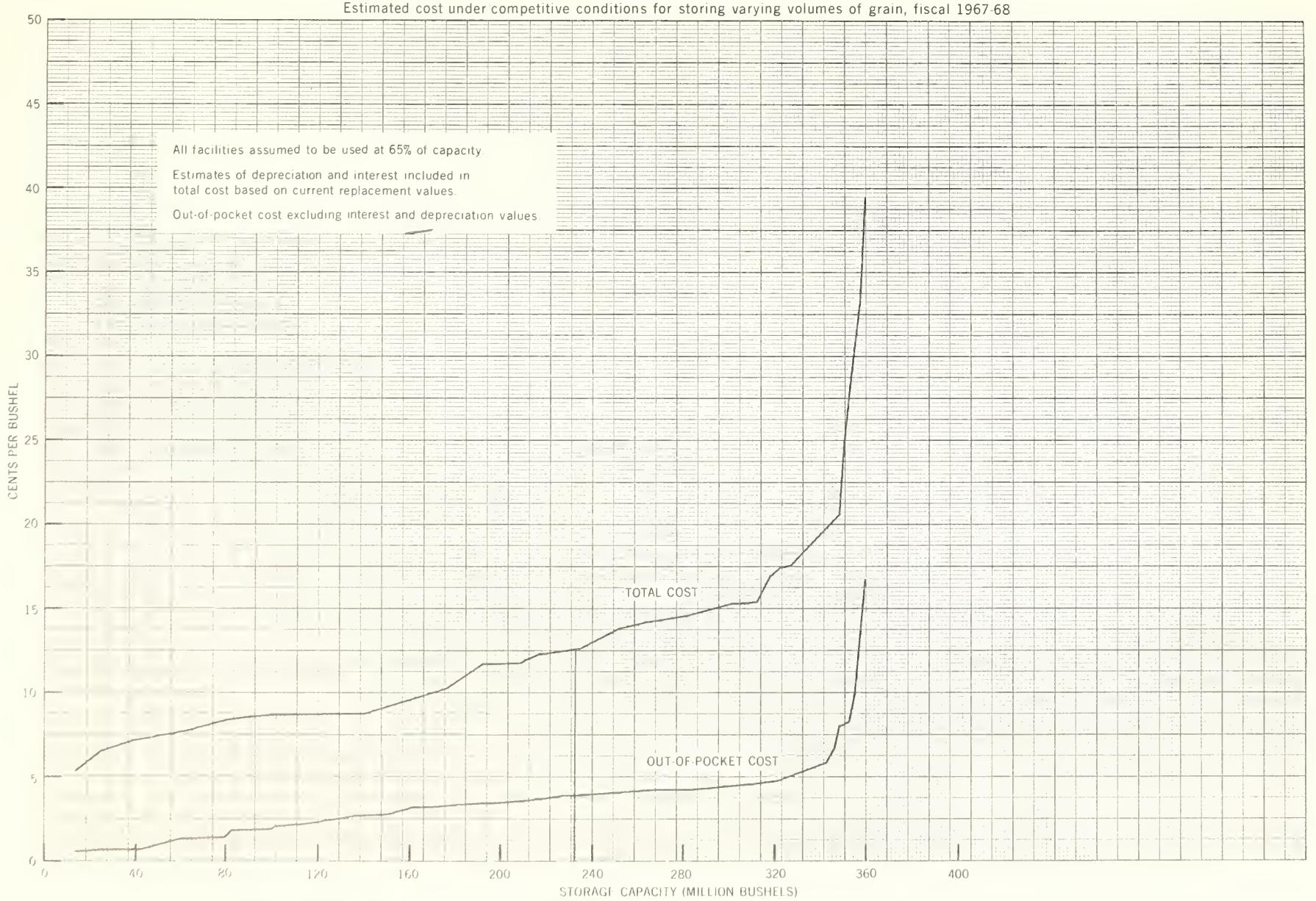

FIGURE 6

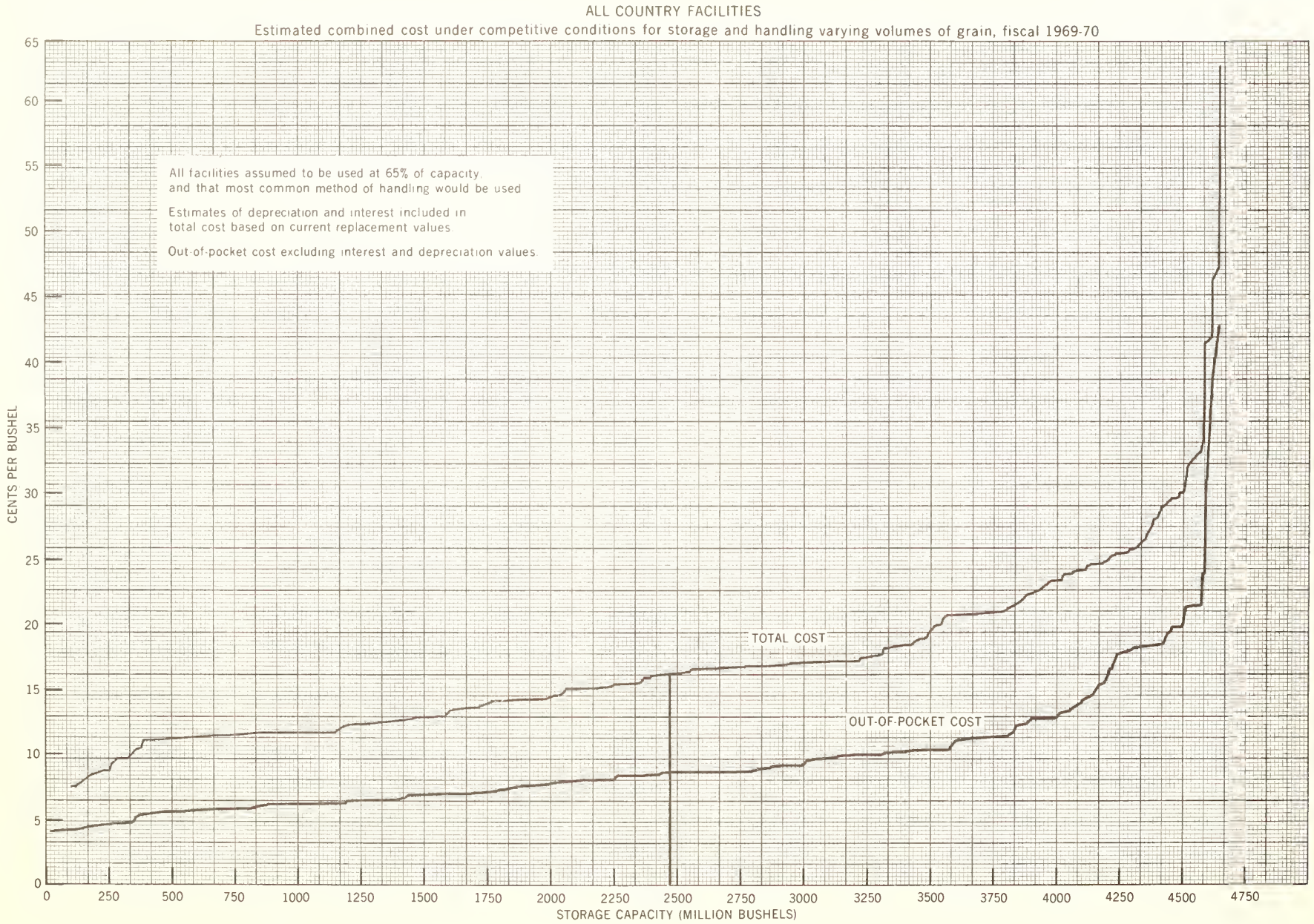
ALL COUNTRY FACILITIES
Estimated combined cost under competitive conditions for storage and handling varying volumes of grain, fiscal 1969-70
All facilities assumed to be used at 65% of capacity, and that most common method of handling would be used
Estimates of depreciation and interest included in total cost based on current replacement values
Out-of-pocket cost excluding interest and depreciation values
CENTS PER BUSHEL
0
5
10
15
20
25
30
35
40
45
50
55
60
65
TOTAL COST
OUT-OF-POCKET COST
0
250
500
750
1000
1250
1500
1750
2000
2250
2500
2750
3000
3250
3500
3750
4000
4250
4500
4750
STORAGE CAPACITY (MILLION BUSHELS)

FIGURE 7

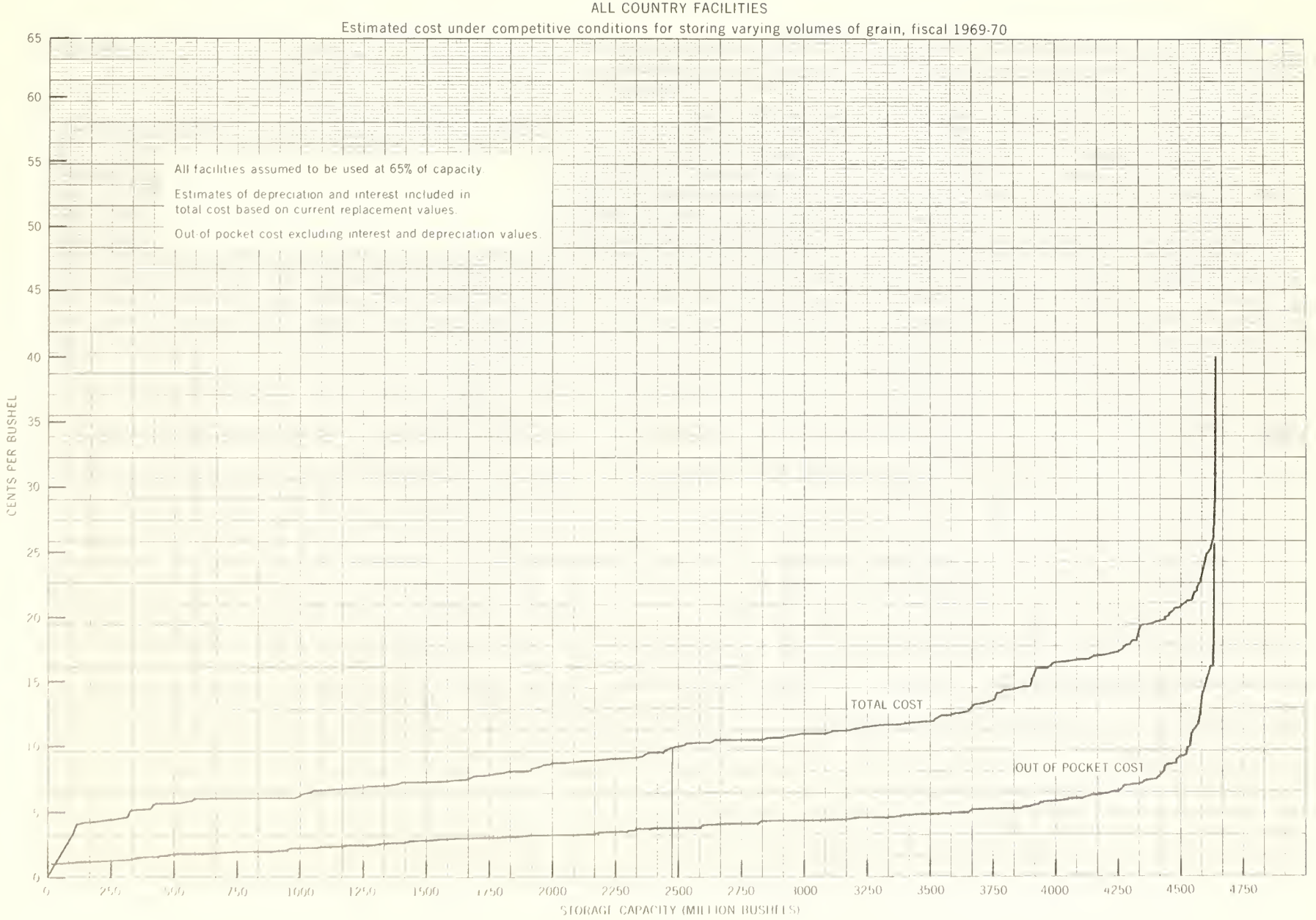
ALL COUNTRY FACILITIES
Estimated cost under competitive conditions for storing varying volumes of grain, fiscal 1969-70
All facilities assumed to be used at 65% of capacity.
Estimates of depreciation and interest included in total cost based on current replacement values.
Out-of pocket cost excluding interest and depreciation values.
TOTAL COST
OUT OF POCKET COST
CENTS PER BUSHEL
STORAGE CAPACITY (MILLION BUSHELS)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
0
250
500
750
1000
1250
1500
1750
2000
2250
2500
2750
3000
3250
3500
3750
4000
4250
4500
4750

FIGURE 8

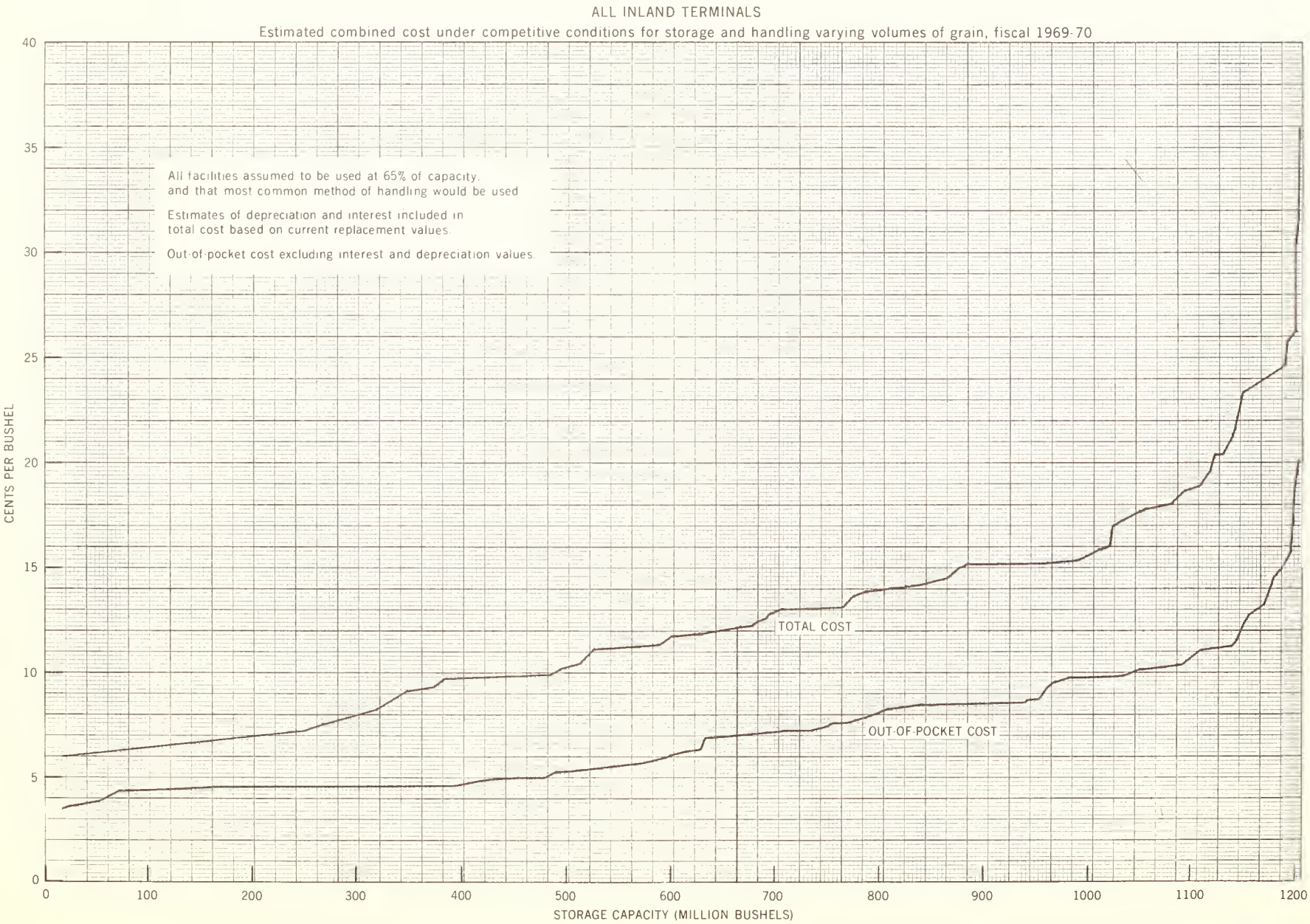
ALL INLAND TERMINALS
Estimated combined cost under competitive conditions for storage and handling varying volumes of grain, fiscal 1969-70
All facilities assumed to be used at 65% of capacity, and that most common method of handling would be used
Estimates of depreciation and interest included in total cost based on current replacement values.
Out-of-pocket cost excluding interest and depreciation values.
TOTAL COST
OUT-OF-POCKET COST
CENTS PER BUSHEL
STORAGE CAPACITY (MILLION BUSHELS)
0
5
10
15
20
25
30
35
40
0
100
200
300
400
500
600
700
800
900
1000
1100
1200

FIGURE 9

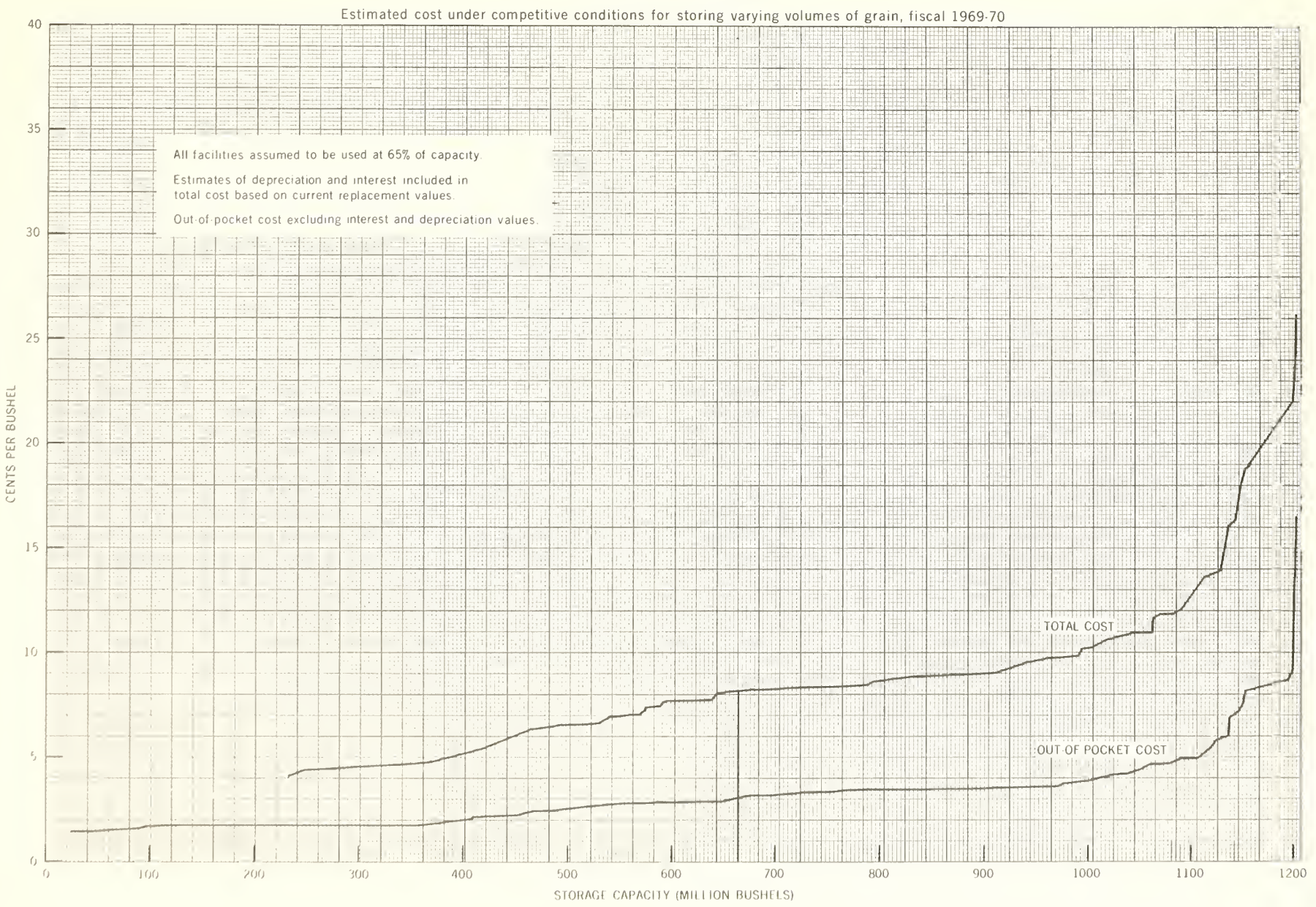
ALL INLAND TERMINALS
Estimated cost under competitive conditions for storing varying volumes of grain, fiscal 1969-70
All facilities assumed to be used at 65% of capacity.
Estimates of depreciation and interest included in total cost based on current replacement values.
Out-of-pocket cost excluding interest and depreciation values.
TOTAL COST
OUT-OF-POCKET COST
CENTS PER BUSHEL
0
5
10
15
20
25
30
35
40
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
STORAGE CAPACITY (MILLION BUSHELS)

FIGURE 10

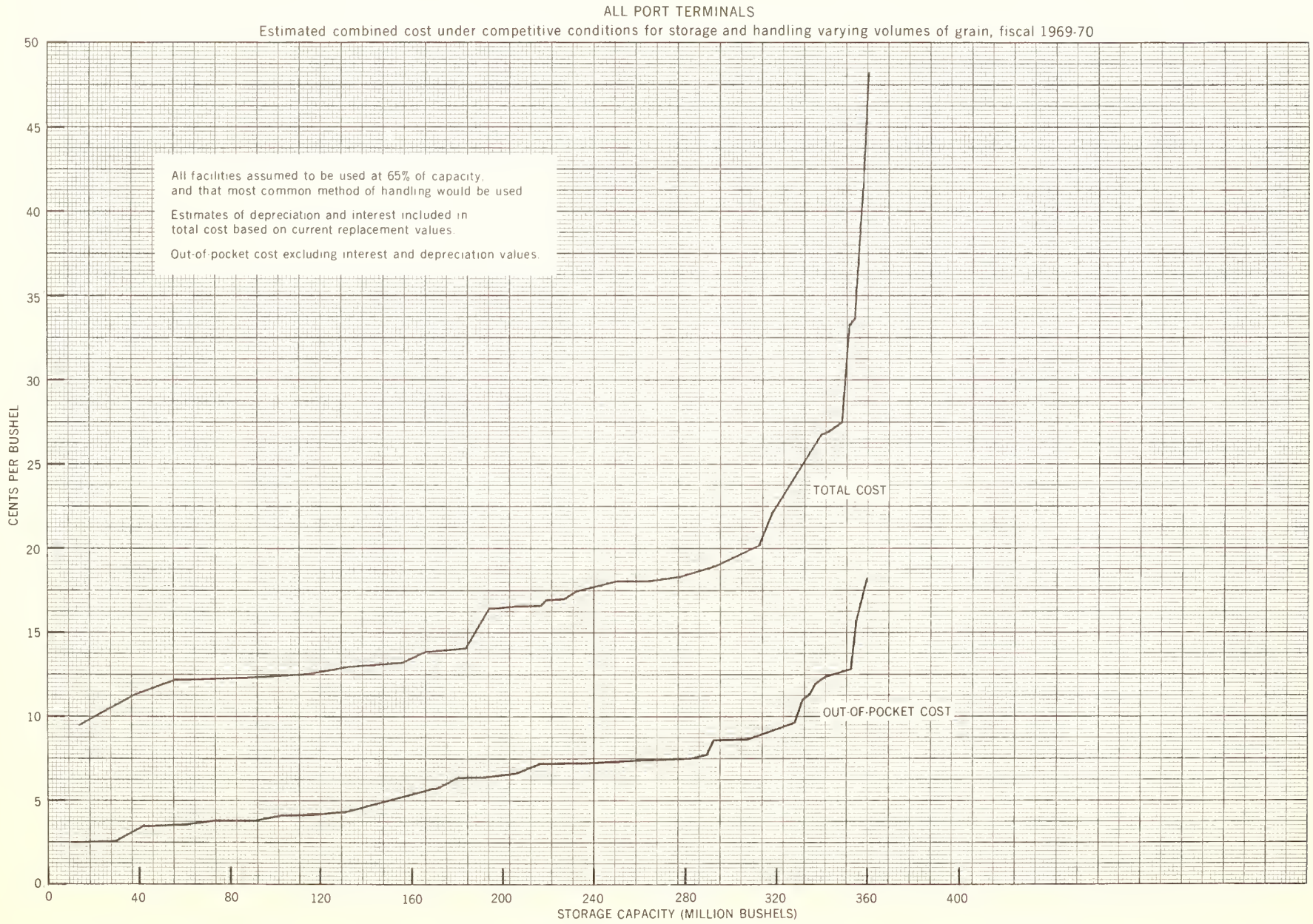
ALL PORT TERMINALS
Estimated combined cost under competitive conditions for storage and handling varying volumes of grain, fiscal 1969-70
All facilities assumed to be used at 65% of capacity, and that most common method of handling would be used
Estimates of depreciation and interest included in total cost based on current replacement values.
Out-of-pocket cost excluding interest and depreciation values.
TOTAL COST
OUT-OF-POCKET COST
CENTS PER BUSHEL
STORAGE CAPACITY (MILLION BUSHELS)
0
5
10
15
20
25
30
35
40
45
50
0
40
80
120
160
200
240
280
320
360
400

FIGURE 11

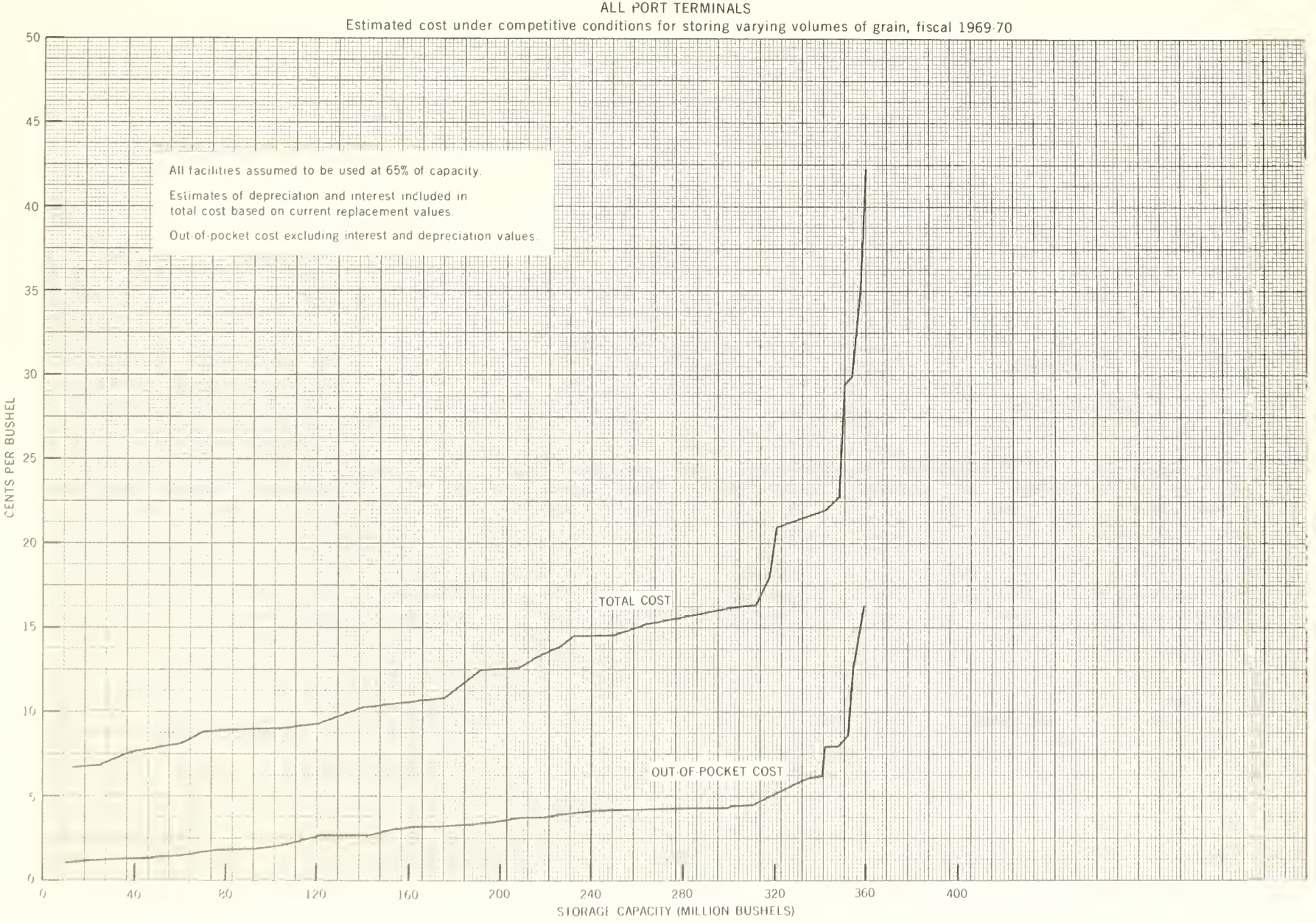
ALL PORT TERMINALS
Estimated cost under competitive conditions for storing varying volumes of grain, fiscal 1969-70
All facilities assumed to be used at 65% of capacity.
Estimates of depreciation and interest included in total cost based on current replacement values.
Out-of-pocket cost excluding interest and depreciation values.
TOTAL COST
OUT-OF-POCKET COST
CENTS PER BUSHEL
0
5
10
15
20
25
30
35
40
45
50
0
40
80
120
160
200
240
280
320
360
400
STORAGE CAPACITY (MILLION BUSHELS)

FIGURE 12

Table 4.--All facilities: Weighted average cost per bushel for handling and storing grains, United States, fiscal 1967-68

Cost item	Received by--			Loadout by--			Storage
	Truck	Rail	Water	Truck	Rail	Water	
	Cents						
Fixed costs:							
Building & equipment depreciation 1/	0.512	0.466	0.291	0.713	0.695	0.225	4.980
Building & equipment insurance	.010	.011	.004	.024	.014	.004	.267
Building & equipment taxes	.053	.064	.041	.204	.073	.030	1.243
Licenses & bonds	--	--	--	--	--	--	.063
Interest in investment 2/	.272	.259	.156	.469	.382	.124	4.804
Total fixed cost per bushel	.847	.800	.492	1.410	1.164	.383	11.357
Variable costs:							
Direct labor	.658	.770	.728	.953	.935	.377	.603
Administrative overhead	.246	.221	.104	.280	.385	.095	.257
Electricity, heat, etc.	.086	.061	.080	.145	.115	.033	.121
Truck expenses	.049	.006	.004	.088	.033	.004	--
Building repairs	.009	.004	.004	.004	.004	.004	.877
Equipment repairs	.063	.050	.050	.133	.081	.031	.051
Insurance on grain	--	--	--	--	--	--	.178
Taxes on grain	--	--	--	--	--	--	.109
Fumigation	--	--	--	--	--	.030	.144
Other 3/	.252	.243	.102	.389	.305	.139	.288
Interest on working capital 4/	.017	.021	.011	.034	.028	.009	.055
Total variable cost per bushel	1.380	1.376	1.083	2.026	1.886	.722	2.683
Total cost per bushel	2.227	2.176	1.575	3.436	3.050	1.105	14.040

1/ Calculations based on rebuilding facilities at 1967-68 construction costs and using standardized depreciation rates.

2/ Calculated at 6.5 percent of one-half of the 1967-68 replacement value of buildings and equipment.

3/ Includes such item as supplies, audit, legal, protective services, dues, subscriptions, travel, advertising, donations, etc.

4/ Calculated at 6.0 percent per annum, borrowed quarterly, of the total out-of-pocket cost.

Table 5.--All facilities: Weighted average cost per bushel for handling and storing grains, United States, fiscal 1969-70

Cost item	Received by--			Loadout by --			Storage
	Truck	Rail	Water	Truck	Rail	Water	
	Cents						
Fixed costs:							
Building & equipment depreciation 1/	0.544	0.493	0.307	0.754	0.738	0.239	4.616
Building & equipment insurance	.010	.011	.004	.024	.015	.004	.237
Building & equipment taxes	.056	.071	.046	.228	.082	.034	1.215
Licenses & bonds	--	--	--	--	--	--	.051
Interest on investment 2/	.304	.293	.175	.524	.426	.141	4.699
Total fixed cost per bushel	.914	.868	.532	1.530	1.261	.418	10.818
Variable costs:							
Direct labor	.700	.816	.778	1.005	.980	.399	.633
Administrative overhead	.262	.242	.110	.296	.403	.091	.272
Electricity, heat, etc.	.086	.061	.080	.146	.115	.033	.121
Truck expenses	.051	.006	.004	.088	.032	.004	--
Building repairs	.010	.005	.004	.005	.005	.005	.976
Equipment repairs	.072	.056	.056	.147	.091	.035	.054
Insurance on grain	--	--	--	--	--	--	.177
Taxes on grain	--	--	--	--	--	--	.109
Fumigation	--	--	--	--	--	.030	.144
Other 3/	.266	.263	.109	.413	.325	.048	.297
Interest on working capital 4/	.017	.021	.011	.035	.028	.009	.055
Total variable cost per bushel	1.464	1.470	1.152	2.135	1.979	.754	2.838
Total cost per bushel	2.378	2.338	1.684	3.665	3.240	1.172	13.656

1/ Calculations based on rebuilding facilities at estimated 1969-70 construction costs and using standardized depreciation rates.

2/ Calculated at 7.0 percent of one-half of the 1969-70 estimated replacement value of buildings and equipment.

3/ Includes such items as supplies, audit, legal, protective services, dues, subscriptions, travel, advertising, donations, etc.

4/ Calculated at 6.0 percent per annum, borrowed quarterly of the total out-of-pocket cost.

Table 6.--All country facilities: Weighted average cost per bushel for handling and storing grains, United States, fiscal 1967-68

Cost item 1/	Received by--		Loadout by--		Storage
	Truck	Rail 2/	Truck	Rail	
	Cents				
Fixed costs:					
Building & equipment depreciation	0.481	--	0.468	0.913	3.720
Building & equipment insurance	.012	--	.017	.026	.282
Building & equipment taxes	.052	--	.074	.104	.860
Licenses & bonds	--	--	--	--	.108
Interest on investment	.259	--	.241	.438	3.613
Total fixed cost per bushel	.804	--	.800	1.481	8.583
Variable costs:					
Direct labor	.659	--	.854	.951	.635
Administrative overhead	.421	--	.287	.637	.386
Electricity, heat, etc	.112	--	.159	.160	.208
Truck expenses	.101	--	.107	.093	--
Building repairs	.024	--	.005	.005	.969
Equipment repairs	.065	--	.073	.124	.033
Insurance on grain	--	--	--	--	.233
Taxes on grain	--	--	--	--	.046
Fumigation	--	--	--	--	.170
Other	.297	--	.348	.534	.437
Interest on working capital	.023	--	.024	.034	.068
Total variable cost per bushel	1.702	--	1.857	2.538	3.185
Total cost per bushel	2.506	--	2.657	4.019	11.768

1/ See footnotes, table 4, for explanation of various cost items.
2/ Insufficient data.

Table 7.--All country facilities: Weighted average cost per bushel for handling and storing grains, United States, fiscal 1969-70

Cost item 1/	Received by--		Loadout by--		Storage
	Truck	Rail 2/	Truck	Rail	
			Cents		
Fixed costs:					
Building & equipment depreciation	0.510	--	0.490	0.969	3.471
Building & equipment insurance	.012	--	.017	.026	.261
Building & equipment taxes	.058	--	.083	.116	.850
Licenses & bonds	--	--	--	--	.086
Interest on investment	.290	--	.267	.485	3.526
Total fixed cost per bushel	.870	--	.857	1.596	8.194
Variable costs:					
Direct labor	0.707	--	0.886	0.970	0.673
Administrative overhead	.446	--	.305	.676	.411
Electricity, heat, etc	.112	--	.159	.160	.208
Truck expenses	.101	--	.107	.093	--
Building repairs	.031	--	.006	.007	1.085
Equipment repairs	.074	--	.081	.140	.037
Insurance on grain	--	--	--	--	.233
Taxes on grain	--	--	--	--	.046
Fumigation	--	--	--	--	.170
Other	.317	--	.369	.566	.463
Interest on working capital	.023	--	.024	.034	.068
Total variable cost per bushel	1.811	--	1.937	2.646	3.394
Total cost per bushel	2.681	--	2.794	4.242	11.588

1/ See footnotes, table 5, for explanation of various cost items.
2/ Insufficient data.

Table 8.--All inland terminals: Weighted average cost per bushel for handling and storing grains, United States, fiscal 1967-68

Cost item 1/	Received by--		Loadout by--		Storage
	Truck	Rail	Truck	Rail	
			Cents		
Fixed costs:					
Building & equipment depreciation	0.605	0.457	0.684	0.453	5.627
Building & equipment insurance	.011	.006	.021	.008	.255
Building & equipment taxes	.066	.059	.106	.052	1.594
Licenses & bonds	--	--	--	--	.049
Interest on investment	.328	.249	.382	.262	5.409
Total fixed cost per bushel	1.010	.771	1.193	.775	12.934
Variable costs:					
Direct labor	.647	.760	.927	.766	.665
Administrative overhead	.241	.258	.292	.365	.243
Electricity, heat, etc	.074	.056	.100	.108	.088
Truck expenses	.049	.008	.124	.018	--
Building repairs	.004	.003	.004	.004	.722
Equipment repairs	.047	.038	.133	.036	.041
Insurance on grain	--	--	--	--	.131
Taxes on grain	--	--	--	--	.181
Fumigation	--	--	--	--	.179
Other	.330	.200	.534	.306	.286
Interest on working capital	.016	.021	.037	.027	.060
Total variable cost per bushel	1.408	1.344	2.151	1.630	2.596
Total cost per bushel	2.418	2.115	3.344	2.405	15.530

1/ See footnotes, table 4, for explanation of various cost items.

Table 9.--All inland terminals: Weighted average cost per bushel for handling and storing grains, United States, fiscal 1969-70

Cost item 1/	Received by--		Loadout by--		Storage
	Truck	Rail	Truck	Rail	
	Cents				
Fixed costs:					
Building & equipment depreciation	0.643	0.483	0.725	0.482	5.218
Building & equipment insurance	.011	.006	.021	.008	.223
Building & equipment taxes	.068	.066	.119	.059	1.566
Licenses & bonds	--	--	--	--	.040
Interest on investment	.368	.280	.428	.294	5.303
Total fixed cost per bushel	1.090	.835	1.293	.843	12.350
Variable costs:					
Direct labor	.687	.806	.982	.809	.712
Administrative overhead	.257	.286	.306	.376	.260
Electricity, heat, etc.	.074	.056	.100	.108	.088
Truck expenses	.052	.008	.124	.018	--
Building repairs	.004	.004	.005	.005	.794
Equipment repairs	.054	.042	.148	.040	.041
Insurance on grain	--	--	--	--	.131
Taxes on grain	--	--	--	--	.181
Fumigation	--	--	--	--	.179
Other	.348	.215	.568	.325	.286
Interest on working capital	.016	.021	.037	.027	.060
Total variable cost per bushel	1.492	1.438	2.270	1.708	2.732
Total cost per bushel	2.582	2.273	3.563	2.551	15.082

1/ See footnotes, table 5, for explanation of various cost items.

Table 10.--All port terminals: Weighted average cost per bushel for handling and storing grains, United States, fiscal 1967-68

Cost item 1/	Received by--			Loadout by--			Storage
	Truck	Rail	Water	Truck	Rail	Water	
	Cents						
Fixed costs:							
Building & equipment depreciation	0.362	0.481	0.291	0.991	0.961	0.225	4.886
Building & equipment insurance	.005	.020	.004	.037	.018	.004	.279
Building & equipment taxes	.030	.072	.041	.511	.085	.030	.918
Licenses & bonds	--	--	--	--	--	--	.047
Interest on investment	.175	.276	.156	.842	.559	.124	4.730
Total fixed cost per bushel	.572	.849	.492	2.381	1.623	.383	10.860
Variable costs:							
Direct labor	.678	.786	.728	1.093	1.244	.377	.453
Administrative overhead	.098	.157	.104	.251	.195	.095	.168
Electricity, heat, etc.	.084	.071	.080	.221	.089	.033	.105
Truck expenses	.003	.004	.004	.002	.004	.004	--
Building repairs	.004	.006	.004	.005	.005	.004	1.091
Equipment repairs	.092	.070	.050	.186	.129	.031	.086
Insurance on grain	--	--	--	--	--	--	.217
Taxes on grain	--	--	--	--	--	--	.028
Fumigation	--	--	--	--	--	.030	.054
Other	.061	.317	.102	.147	.094	.139	.157
Interest on working capital	.013	.020	.011	.037	.023	.009	.033
Total variable cost per bushel	1.033	1.431	1.083	1.942	1.783	.722	2.392
Total cost per bushel	1.605	2.280	1.575	4.323	3.406	1.105	13.252

1/ See footnotes, table 4, for explanation of various cost items.

Table 11.--All port terminals: Weighted average cost per bushel for handling and storing grains, United States, fiscal 1969-70

Cost item 1/	Received by--			Loadout by--			Storage
	Truck	Rail	Water	Truck	Rail	Water	
	Cents						
Fixed costs:							
Building & equipment depreciation	0.384	0.510	0.307	1.049	1.018	0.239	4.504
Building & equipment insurance	.006	.020	.004	.037	.018	.004	.243
Building & equipment taxes	.034	.080	.046	.570	.094	.034	.873
Licenses & bonds	--	--	--	--	--	--	.041
Interest on investment	.195	.315	.175	.942	.626	.141	4.608
Total fixed cost per bushel	.619	.925	.532	2.598	1.756	.418	10.269
Variable costs:							
Direct labor	.718	.834	.778	1.158	1.319	.399	.445
Administrative overhead	.104	.166	.110	.267	.207	.091	.168
Electricity, heat, etc	.084	.071	.080	.221	.089	.033	.105
Truck expenses	.003	.004	.004	.002	.004	.004	--
Building repairs	.004	.006	.004	.006	.005	.005	1.225
Equipment repairs	.103	.079	.056	.207	.144	.035	.095
Insurance on grain	--	--	--	--	--	--	.217
Taxes on grain	--	--	--	--	--	--	.028
Fumigation	--	--	--	--	--	.030	.054
Other	.064	.344	.109	.157	.104	.148	.166
Interest on working capital	.013	.020	.011	.037	.023	.009	.033
Total variable cost per bushel	1.093	1.524	1.152	2.055	1.895	.754	2.536
Total cost per bushel	1.712	2.449	1.684	4.653	3.651	1.172	12.805

1/ See footnotes, table 5, for explanation of various cost items.

APPENDIX

Method and Procedure

The firms surveyed for this report were randomly selected from the 252 firms studied in 1965 and reported in Costs of Storing and Handling Grain in Commercial Elevators, 1964-65, ERS, USDA, ERS-288, April 1966. A total of 105 firms were selected and from this total, 96 usable schedules were obtained. The subsample included one-third (55 plants) of the country facilities included in the original survey; about one-half (30 facilities) of the inland terminals; and two-thirds (20 facilities) of the port terminals.

Information was obtained by interview on quantities of grain handled, stored, cleaned, dried, shelled, and on other services performed. Data were also collected on changes in such major items as labor costs and administrative overhead costs since the 1964-65 base period.

Cost data and volumes handled and stored in 1967-68 were summarized by type of facility, geographical area, and for the United States. Procedures used to allocate costs to individual functions were the same as those employed in the 1964-65 study. However, changes in crew organization, volumes handled in various functions, and other similar changes resulted in different allocations of total cost than in 1964-65.

Total cost for individual plants were allocated by functions and a unit cost for each function calculated for each facility. Unit cost for each function was then summarized for each type and area. Costs for 1967-68 were calculated by applying the percentage change in individual items to comparable items in 1964-65.

For 1969-70, a new set of cost figures were developed by estimating the percentage change occurring in costs between 1967-68 and 1969-70 and development of estimated volumes expected for the latter period. Cost changes used for 1969-70 are shown on page 28. Each item of cost for each type of facility and each function was weighted in the same manner as in 1964-65 to develop average total cost by function and type of facility for the United States as a whole.

Volumes used for 1969-70 were developed in the following manner:

- Handling and storage volumes for 1969-70 were estimated by projecting production, disappearance, and carryover on a quarterly basis. The latest actual carryover of individual grains, as reported in the November 1968 Wheat Situation, Feed Situation, and Fats and Oils Situation, was used as a basis for these estimates. Production estimates for 1969-70 were based on 1967-68 production and ERS estimates of 1968-69 production.

- Disposition of grains was also estimated in this manner using the Consumer and Marketing Services Grain Marketing News as background.

- To obtain quarterly volumes stored, beginning inventories were added to estimated production and disposition subtracted for this total. Quarterly inventories were then averaged to obtain the estimated average yearly volume stored.

Table 12.--Sample plants: Number, occupancy, and ratio of receipts and shipments to volume stored, 1964-65 and 1967-68

Area and type of facility	Sample plants		Average occupancy			Ratio of receipts to stored volume			Ratio of shipments to stored volume		
	1964-65	1967-68	1964-65 1/	1964-65 2/	1967-68 3/	1964-65 1/	1964-65 2/	1967-68 3/	1964-65 1/	1964-65 2/	1967-68 3/
	Number		Percent								
North Plains: 4/											
Country	33	10	79.5	70.5	32.6	2.5	3.1	3.9	2.5	3.2	3.8
Inland terminals	9	3	82.4	95.3	44.0	2.6	1.1	3.6	2.2	1.1	4.1
Port terminals	--	--	--	--	--	--	--	--	--	--	--
Total area	42	13	81.8	90.6	39.4	2.6	1.4	3.7	2.2	1.4	4.0
Mid-Plains: 5/											
Country	59	16	66.3	70.0	42.7	1.7	1.7	2.7	1.8	1.8	2.5
Inland terminals	26	12	52.4	52.1	22.4	2.2	2.3	4.1	1.8	1.7	2.4
Port terminals	--	--	--	--	--	--	--	--	--	--	--
Total area	43	28	55.3	54.2	24.7	2.1	2.2	3.9	1.8	1.7	2.4
South Plains: 6/											
Country	28	7	67.4	81.2	42.1	0.6	1.2	2.5	0.9	1.4	2.3
Inland terminals	8	5	64.3	65.3	27.9	1.1	1.2	3.9	0.7	0.7	1.7
Port terminals	7	4	74.6	77.6	56.1	20.3	15.6	17.1	20.1	15.5	17.0
Total area	43	16	69.3	74.5	45.6	8.3	7.7	11.7	8.2	7.5	11.2
West: 7/											
Country	15	8	41.6	35.6	33.7	2.7	3.0	3.6	2.4	2.8	3.5
Inland terminals	3	1	51.3	46.5	29.3	2.1	1.9	4.1	2.0	1.9	4.3
Port terminals	8	6	53.8	54.8	49.0	8.2	8.3	14.9	7.9	8.0	15.0
Total area	26	15	49.7	51.2	45.3	6.4	7.3	13.3	6.1	7.0	13.3
Great Lakes: 8/											
Country	25	9	51.3	71.3	56.8	3.4	3.0	6.6	3.3	2.9	6.1
Inland terminals	7	3	48.7	55.9	51.8	3.9	2.7	3.1	2.3	2.4	3.0
Port terminals	9	7	75.9	79.6	65.3	5.4	6.1	5.0	5.1	5.6	5.0
Total area	41	19	62.8	74.6	62.5	4.8	5.4	4.8	4.0	5.0	4.8
South and East: 9/											
Country	5	2	49.4	49.5	55.1	2.5	2.5	2.2	2.7	2.5	1.8
Inland terminals	5	1	59.3	53.7	28.3	7.6	3.0	9.8	1.6	0.4	0.4
Port terminals	5	2	65.3	71.3	65.3	9.7	9.0	11.4	9.8	9.0	11.1
Total area	15	5	60.6	65.0	60.7	8.0	7.5	9.2	6.3	7.4	8.6
United States:											
Country	165	52	63.9	67.9	42.1	1.4	1.8	3.1	1.6	1.9	2.9
Inland terminals	58	25	57.7	57.3	26.8	2.6	2.0	4.0	1.8	1.5	2.6
Port terminals	29	19	69.2	71.4	58.2	11.9	9.8	12.2	11.6	9.5	11.5
All facilities	252	96	62.1	64.2	41.6	4.9	5.2	8.3	4.5	4.9	7.5

1/ Includes all plants surveyed in 1964-65 study.
2/ 1964-65 data for 96 plants resurveyed in 1967-68.
3/ 1967-68 data for 96 plants.
4/ N. Dak., S. Dak., and Minn. (excluding port facilities.)
5/ Neb., Kans., Colo., Wyo., Iowa and, Mo.
6/ Okla., N. Mex., and Texas plus all Gulf port facilities.
7/ Wash., Oreg., Idaho, Mont., Calif., Ariz., Nev., and Utah.
8/ Wis., Ill., Ind., Ohio, Mich., and Minn. port facilities.
9/ Ark., Miss., S. C., Tenn., Ky., N. Y., Va., Pa., N. J., Md., Del., La. (exluding port facilities) Ala., Ga., N. C., W. Va., and New England.

Basis for Projecting 1967-68 Costs to 1969-70

The following percentage changes were used to calculate average grain handling and storage costs expected to prevail in 1969-70. These estimates were applied to the 96 sample plants from which actual cost data were collected in the fall of 1968.

Cost item	Estimated percent of change from 1967-68	Basis for change
	Fixed costs	
Building and equipment depreciation	6.0	Boeckh's Manual of Appraisals--projections of past years building cost indices.
Building and equipment insurance	No change	Information available from the Farm Production Economics Division, ERS, indicates only minute changes in insurable values and rates over a short term.
Building and equipment taxes	12.0	Farm Real Estate Taxes--Recent trends and developments by ERS. The percentage change used reflects to a large degree increased demands by local tax authorities for revenue.
Building and equipment interest on invested capital	12.0	Reflects increased asset replacement cost of 6 percent and capital borrowed at 7.0 percent interest on the average investment value.
	Variable Costs	
Direct labor	8.0	Employment and Earnings Report on the Labor Force--U.S. Dept. of Labor projections based on various industrial wage rate changes.
Administrative overhead	8.0	Same as direct labor

Continued--

Electricity, heat, etc.	No change	The Federal Power Commission: Typical Electrical Bills; indicate very little change in average utility rates.
Building and equipment repairs	12.0	Compatible with increased building and equipment replacement costs and contract labor wages.
Insurance on grain	No change	Stock insurance rate tied to building insurance rate. Available information indicates little value change anticipated.
All other items	6.0	Estimated on general price level change.

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